

## **Forecasting Air Quality with the U.S. EPA's Community Multiscale Air Quality (CMAQ) Model**

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This project encompasses a new major application of the U.S. Environmental Protection Agency's (U.S. EPA) Community Multiscale Air Quality (CMAQ) model to real-time air quality forecasting of near-surface ozone and particulate matter (PM<sub>2.5</sub>). It includes the transition of a research-grade air quality assessment model to an operational model used in daily simulations to provide forecast guidance. A collaborative partnership between the U.S. EPA and the U.S. Department of Commerce/National Oceanic and Atmospheric Administration (NOAA) brings together the strengths of these two agencies' capabilities in atmospheric monitoring and modeling to develop an operational capability for producing national modeling guidance for short-term air quality forecasts for ozone and PM<sub>2.5</sub>. The initial operational modeling system, being run at the NOAA's National Center for Environmental Prediction (NCEP), consists of the NOAA's Eta meteorological model linked with the U.S. EPA's CMAQ model. The Eta model (also known as the North American Mesoscale model) is the principal meteorological forecast model used operationally by the NCEP to provide daily short-term forecast guidance over the U.S. The CMAQ model is the most current version of the U.S. EPA's numerical air quality simulation system, providing local, regional, and national coverage for ozone, particulate matter, and other pollutants of concern. The current Eta-CMAQ system produces hourly forecasts of ozone and other photooxidants on a three-dimensional model grid of application covering the eastern U.S. with a grid resolution of 12 km. Hourly meteorological data are provided by the Eta model to the CMAQ model. In addition, source emissions data from the U.S. EPA's national inventory are provided to the modeling system on an hourly basis, and modulated, as necessary, by meteorological fields from the Eta model. Ozone air quality data from the U.S. EPA's AIRNow database are used for model evaluation.

The Eta-CMAQ model system was run for the past two ozone seasons (2003, 2004) in the northeastern U.S. on a twice-daily basis. Experimental guidance was issued to the forecaster community and the public in 2004. Evaluation statistics from the system over the past two summers showed that the system provided value beyond a persistence-based forecast for both 1- and 8-hour maximum daily surface ozone predictions. Based on criteria of forecast accuracy and timeliness, NOAA declared the Eta-CMAQ air quality forecasting system fully operational in September 2004. During the 2005 ozone season, additional forecast domains will be run for the eastern U.S. and the continental U.S. Over the next five years, the model domain will be expanded to cover the entire U.S. and forecast guidance will be provided for PM<sub>2.5</sub> and regional haze. Model forecasts will also be extended from 24 to 72 hours over the next ten years.

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